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Incentivizing Water-Efficient Growth in Austin

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Incentivizing Water-Efficient Growth in Austin

by

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Report

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Abstract

Incentivizing Water-Efficient Growth in Austin

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This report examines water impact fees as a financial tool for incentivizing water-efficient growth for the purpose of determining whether this strategy represents a cost-effective solution for the City of Austin.

Currently, the City of Austin in the initial stages of developing its first long-range integrated water resource plan. As part of the planning process, the city will be projecting municipal demands and identifying future needs over a 100-year time horizon. To achieve the plan's vision for a water resilient future, water conservation and demand-side management will play an integral part in the city's holistic approach. Planning for the future, however, involves many uncertainties—future demand, population growth, drought conditions, etc. To tackle these complex issues, it is critical for the city to explore a diverse portfolio of options for reducing future water demands. Aside from more traditional policy mechanisms for promoting conservation, what additional strategies can the city pursue? To address this question, this report evaluates the potential for designing water impact fees to encourage water-efficient growth in new development.

As part of this analysis, this report evaluates the political, legal, and financial feasibility of implementing conservation-based impact fee structures. To begin, the report provides an overview of Austin's prior efforts to promote water conservation and how these accomplishments have positioned the city to develop its first IWRP. Next, the rules and procedures dictating how cities in Texas calculate impact fees as well as typical fee structures are discussed. The third section evaluates Austin's current and projected water use patterns to help identify specific strategies the city can use to incentivize water efficiency in new development. A financial analysis of these strategies is then provided to illustrate how the city could implement a conservation-driven impact fee structure and what the cost-effectiveness of doing so would be. The report concludes by offering recommendations on how the City of Austin can incorporate this strategy into its comprehensive water management plan.

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Chapter 1: Introduction

For many years now, the City of Austin has been expanding at a tremendous rate. As the fiscal strains associated with population growth and new development continue to amount, Austin is confronting a very complex issue: how to balance growth with increasing water demands, limited water supplies, diverse budgetary requirements, and an uncertain climate future. At this very moment, the City of Austin and its future as a thriving community are at a pivotal juncture—not only is the city in the process of completing its revised land use code, *CodeNEXT*, in accordance with the 2012 *Imagine Austin Comprehensive Plan*, the city is also developing *Water Forward*, a city-wide integrated water resource plan (IWRP). The plan will identify the projected demands and needs of Austin's rapidly growing population over a 100-year time horizon and utilize these to inform future water management strategies. To achieve the plan's vision of a "diversified, sustainable, and resilient water future", water conservation and demand-side management will play an integral part in the city's holistic approach.

In the past decade, the City of Austin has already made considerable strides in city-wide water conservation to help secure this resilient water future. These efforts helped lay the groundwork for the IWRP's 'water forward' ethos and will continue to guide the water planning process. Leveraging water conservation as the driving force behind the IWRP's approach to water management will be critical to ensuring greater longevity of the city's water supply and protecting the quality of life for residents in the decades ahead. The relationship between population growth, land use development, and water demand is a very complex issue that is further compounded by the unpredictability of drought here in Texas. As the need to address this challenge becomes ever more pressing, Austin's call to action has boldened. Tackling this complex problem requires a multi-pronged water management approach driven by complementary supply-side and demand-side strategies. Though the planning process for *Water Forward* is still in its early stages, a laundry list of strategies has been drafted by the City of Austin. Many of these solutions center on ordinance- and incentive-based approaches for encouraging reduced consumption across multiple sectors (e.g., single family residential, multi-family residential, commercial) and targets (e.g., new development, existing development, re-development). Beyond these more traditional policy mechanisms, however, what additional strategies can the City of Austin employ to encourage water-efficient growth?

The following report addresses this question by focusing on a financial tool utilized less frequently by municipalities: water impact fees (also referred to as water connection fees). Public utilities rely primarily on water rates and water impacts fees for their largest source of revenue. To help cover the costs associated with delivering water services to new development, municipalities assess water impact fees to developers at the time of construction. In a recent study, several municipalities were highlighted across the country for having successfully re-structured their water impact fees to incentivize water-efficiency. With these successes as a guide, this report seeks to answer the following question: Can a similar strategy of using water impact fees to encourage water-efficient growth be achieved in the City of Austin, and if so, what would the impact fee structure look like?

To answer this question, the following analysis evaluates the political, legal, and financial feasibility of implementing such a strategy. This report begins by providing an overview of Austin's prior efforts to promote water conservation and how these accomplishments have positioned the city for its current task—the development of a long-range water resource plan. Next, the rules and procedures dictating how cities in Texas calculate impact fees as well as the types of fee structures they use are discussed. In the third section, the City of Austin's current and projected water use patterns are evaluated for the purposes of identifying specific strategies the city can use to incentivize water efficiency in new development. A financial analysis of these strategies is then provided to illustrate how the city could implement a conservation-driven impact fee structure and what the cost-effectiveness of doing so would be. Based on the results of this financial analysis, this report concludes by offering recommendations on how the City of Austin can incorporate this strategy into its comprehensive water management plan.

Exploring opportunities to reduce the city's future demands is critical to the IWRP planning process. If proven to be a politically, legally, and financially viable tool for encouraging water-efficient growth, conservation-driven impact fee structures can help facilitate the city's long-term objective of securing a sustainable, resilient water future for the residents of Austin. Planning for the city's future water demands and needs over a 100-year time horizon involves a lot of uncertainties. However, leveraging the benefits of conservation through multiple savings avenues will not only strengthen the reliability of the city's water supply, but also help offset the need for costly infrastructure upgrades—thus providing the city with greater financial and water security as it looks ahead to the next 100 years.

Chapter 2: History of Conservation in Austin

Laying the groundwork for the city's progressive, forward-thinking approach to water planning are the city's longstanding efforts to implement water conservation measures and expand water awareness and literacy city-wide. For the City of Austin, along with other nearby communities such as San Antonio, water conservation has been evolving into more than just a goal—it is becoming a way of life. Of course, this has much to do with the unique character of the city and its residents, but it is also attributable to the city's susceptibility to drought. Just six years ago, the city (along with the entire state of Texas) experienced the most severe drought since the state's record-breaking drought of 1956. Prior to this, however, Austin has experienced a number droughts of varying severity and length, as the graph below illustrates. It is this unpredictability that has driven the city to set higher water conservation targets, including a 2006 City Council resolution to reduce peak water demand by 1% per year for 10 years, as well as a 2010 action plan to reduce water consumption to 140 gallons per capita per day (GPCD) by 2020.

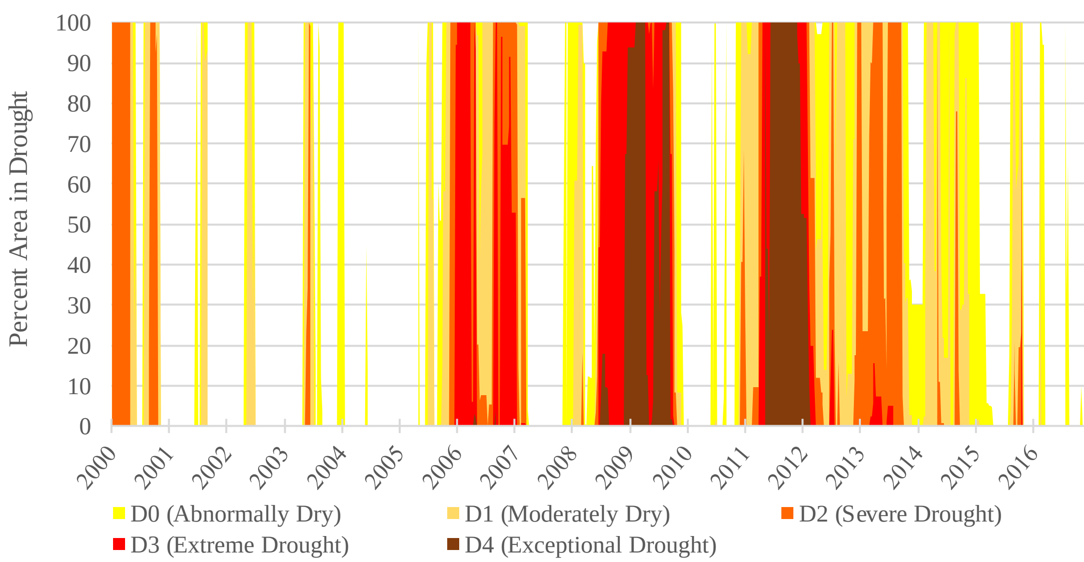

Figure 1: Historical Drought Trends in Austin (2000-2016).
(Source: National Drought Mitigation Center, 2017)

To reach each of these goals, the city built upon previous conservation initiatives, including community outreach and education, customer incentive programs, and conservation-based water pricing. As part of the 2006 resolution, City Council created a Water Conservation Task Force (WCTF) and charged the appointees with preparing a policy document outlining strategies and implementation plans for meeting the 1% reduction target. Strategies recommended by the task force included:

- Update plumbing codes to be inclusive of new and existing plumping fixtures;
- Establish efficiency standards for cooling towers and commercial clothes washers;
- Make outdoor watering restrictions mandatory;
- Create new requirements for residential and commercial irrigation systems and landscape design;
- Expand free irrigation audit program;
- Set more aggressive water rates to encourage conservation.

(Source: City of Austin, 2007)

These recommendations set in motion continued support for more robust water efficiency measures. In 2009, City Council established the Citizens Water Conservation Implementation Task Force (CWCITF) to outline a complementary list of short- and long-term strategies for reducing water use even further. A key outcome of the task force's *Water Conservation 2020 Report* was its recommendation to the city to establish a 140 GPCD conservation target by 2020. To meet the ambitious conservation goal set by the task force, the city developed its *140 GPCD Conservation Plan*, which offered an expanded suite of conservation strategies. Recommendations put forth in this plan included:

- Offer comprehensive efficiency upgrades for the commercial, institutional, and industrial (CII) sector (e.g., facility audits and rebates; incentives for water-saving equipment retrofits; WaterWise Partner program for car washes);
- Provide incentives for replacing turf grass with native plants;
- Limit the amount of irrigated area for residential and commercial new construction;
- Expand outdoor watering restrictions year-round for residential customers;
- Assess administrative fine to water waste violators;
- Implement water budgets or excess use rates for commercial and multi-family properties.

(Source: City of Austin, 2010)

All in all, the *140 GPCD Conservation Plan* provided a comprehensive list of strategies that addressed many avenues for achieving increased water savings city-wide. Coincidently, the 2010 conservation plan arrived on the heels of the 2011 drought, which persisted for nearly a year at Stage 2 (severe drought) and higher. As the graph below demonstrates, the city's GPCD spiked sharply in 2011 due to increased water demands associated with the drought conditions, but has since continued to drop-off quickly, even as the city's service population has grown rapidly.

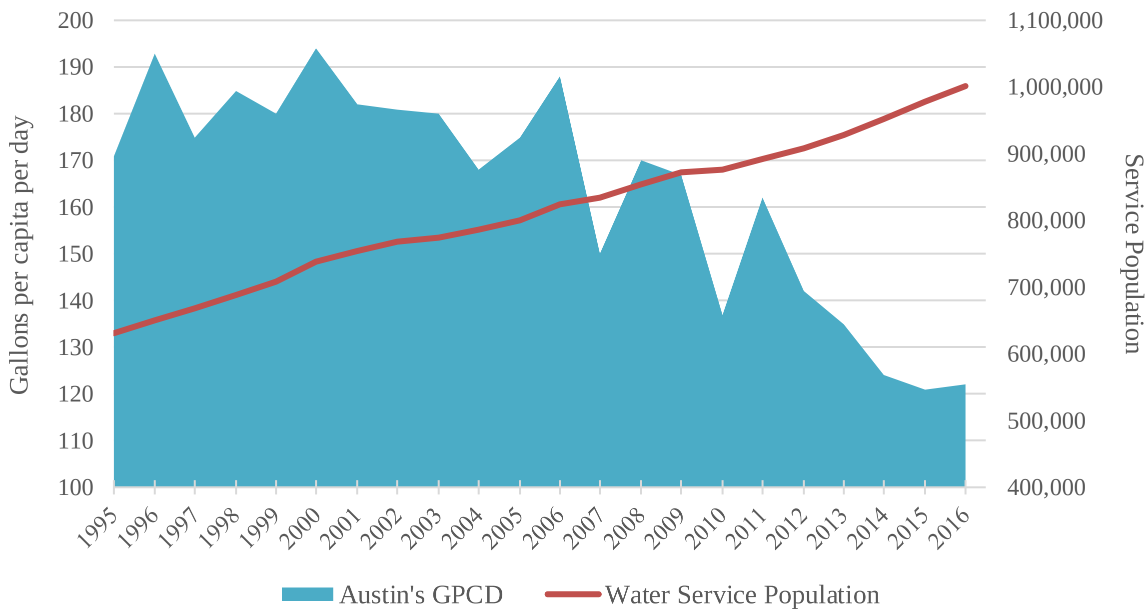

Figure 2: Austin water consumption in gallons per capita per day. (Source: City of Austin, 2017)

This significant drop in GPCD, which reached an all-time low in 2015 of 121, goes well beyond the city's original conservation target of 140. Although this recent trend in Austin's water usage can be attributed in part to the drought letting up in late 2011, the city continued to experience intermittent spells of drought up until the the end of 2014. This serves to demonstrate the measurable impact that the city's heighted focus on conservation had on overall municipal water use. To further secure these water savings following the drought in 2011, the city mandated permanent, year-round twice-per-week outdoor watering restrictions. According to city estimates, implementation of no more than twice per week restrictions has generated over 7% savings in municipal water consumption (Sierra Club, 2015). Just last May, however, the city set even higher restrictions on outdoor watering by limiting it to once-per-week for residential properties with irrigation systems and all commercial, multi-family, and school properties.

These ordinances, combined with other conservation strategies, have allowed the city to not only exceed its 140 GPCD goal, but also do so much earlier than anticipated. Compared to other metropolitan water utilities across Texas, which use an average of 239 GPCD, Austin has set the bar high for municipal water conservation[1]. More recently, Austin's role as a leader in conservation was highlighted in an evaluation of over 300 Texas water utilities and their progress towards meeting conservation goals[2]. Out of 126 large and medium-sized public water utilities (based on a population of 25,000 and above), Austin achieved the highest score (90 out of 100 points)—outperforming San Marcos (85), Frisco (82), Fort Worth (78), San Antonio (73), and El Paso (71) (Sierra Club, 2016). Notable acknowledgements include Austin's success in setting and reaching strong conservation goals, employing comprehensive best management practices (as identified by TWDB), adopting robust outdoor watering restrictions, providing easy access to conservation information, and creating citizen task forces (Sierra Club, 2016). The success of the city's conservation initiatives can be credited, in large part, to the abundant public support it has been able to garner through active citizen engagement (Sierra Club, 2016). Today, as the city works to develop its 100-year water resource plan, this same emphasis on citizen participation serves as its guiding framework.

Though still in the early stages of preparation, *Water Forward* already encapsulates the city's progressive ethos—it is ambitious, inclusive, and proactive. Starting in 2014, City Council passed a resolution creating the Water Resource Planning Task Force to

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[1] Per the Texas Water Development Board (TWDB), the GPCD for the five largest metropolitan areas in Texas are as follows: Houston (122), San Antonio (129), Dallas (189), Austin (116), Fort Worth (139). It should be noted, however, that these GPCD estimations are based on total population of the urban area (not the entire service area) and net municipal water sales (excluding wholesale users). Though these calculations differ slightly from the municipal utility's overall GPCD, they are useful for comparative purposes (TWDB, 2017).

[2] These conservation goals are outlined in a utility's water conservation plan. The TWDB requires retail public utility providing potable water service to 3,300 or more connections to submit a water conservation plan on a 5-year basis and provide an annual report on the progress of program implementation.

undertake an assessment of the city's water needs and make recommendations on alternative sources of water, including conservation, reuse, regional transmission systems and partnerships, groundwater, aquifer storage, and other potential supply options (City of Austin, 2014). In the following months, the team of 11 citizen task force members collaborated on development of the final report, incorporating feedback from nine public meetings. As with previous proposals, this report focused on the city's dependency on a sole water source, the Colorado River's Highland Lakes, and its susceptibility to the impacts of drought. It further emphasized the need to enhance reliability of the city's water supplies by underscoring the inherent connection between water supply, quality of life, economic vitality, and long-term resiliency. Using this as the report's call to action, the task force outlined a suite of goals and measures aimed at both demand reduction and supply augmentation. In their examination of strategies, however, the task force stressed that "saving water, or reducing demand, is widely recognized as the most reliable, affordable and sustainable way to meet water demands" (City of Austin). Given the integrality of conservation to the sustainability of Austin's water supply, the task force identified investment in water efficiency as a guiding principle for future water management.

While many of the demand management strategies put forth in the report complemented conservation initiatives recommended in previous task force proposals, this report was unique in that it evaluated Austin's water supply challenges from a holistic, integrated perspective. Acknowledging the uncertainty of drought, the task force emphasized that prudent planning requires interdisciplinary engagement across departments, informed climate and demand forecasting, and a diverse toolbox of solutions. As such, a key component of the final report was the task force's recommendation for the development of an Integrated Water Resource Plan (IWRP) seeking to accomplish the following:

- Produce a fine grain analysis of the city's future demands and needs;
- Utilize different climate scenarios to measure impacts on water supplies;
- Prioritize conservation investments according to savings potential and cost-effectiveness;
- Provide better understanding of the water rate impacts associated with different strategies.

(Source: City of Austin, 2014)

Unsurprisingly, City Council heeded the recommendations of the task force, charging them with overseeing the development of the IWRP. Since mid-2015, the team of 11 citizen task for members—3 of which were a part of the original task force—have been convening at monthly public meetings to provide feedback and guidance to Austin Water staff as they work with consultants to lay out each component of the plan. The planning process is currently halfway complete, so it remains to be seen which recommended strategies will make it into the final plan. The project team recently began the vetting process for demand-side and supply-side strategies. The demand-side strategies that they have chosen to pursue in their initial evaluations include:

Measure Name	Measure Description	Sector; End Use	Target
Alternative Water Incentives (g, p)	Incentivize on-site (building-scale) alternative water use (for rainwater, stormwater, blackwater, and ac condensate)	All; Nonpotable with potential for potable RWH in Single Family	Existing
Alternative Water Incentives – Graywater (h)	Offer an Incentive to encourage the installation and use of graywater systems	All; Nonpotable indoor and irrigation	Existing and New
Alternative Water Ordinances (f, p)	Require on-site (building-scale) alternative water use (for rainwater, stormwater, blackwater, and ac condensate)	Multifamily, Commercial; Nonpotable	New
Automated Metering Infrastructure (AMI) (b, n)	Implement customer-facing programs that provide real-time water use information, including identification of customer-side leaks and other water-saving opportunities (implemented through Automated Metering Infrastructure - AMI); AMI + customer portal and engagement (including commercial customer benchmarking)	All; All	All
CII Ordinances - Cooling Towers and Steam Boilers (q, r)	Require older cooling towers and steam boilers to meet water efficiency standards and use efficient equipment	Commercial; Colling towers and steam boilers	Existing
CII Ordinances - Swimming Pools (t)	Require swimming pool efficiency (retrofit)	COA, Multifamily, Commercial; Pools	Existing
Development-focused Water Use Estimates/ Benchmarking Plan Submittal (o)	Require water use estimate submittal for new development concurrent with preliminary plan submittal, to be reviewed by City staff for comparison to benchmarks. As part of this review, City staff will provide potential water use efficiency recommendations and information on available incentive and rebate programs.	All; All	New/Re-development

Figure 3: Preliminary Demand Management Options (1 of 2).
(Source: City of Austin, Austin Integrated Water Resource Planning Community Task Force, 2017)

Measure Name	Measure Description	Sector; End Use	Target
Development-focused Water Use Estimates/ Benchmarking Seller Disclosure (s)	Require sellers of commercial property to provide written disclosure of older water using equipment not meeting current standards or fixtures at point of sale to buyers and City staff	Commercial; All	All
Irrigation Efficiency Incentives (j, k)	Expand current irrigation rebate programs to include irrigation system controllers that respond to leaks, high pressure, and soil moisture; Incentivize retrofit of grandfathered irrigation systems to encourage more efficient irrigation systems	All; Irrigation	Existing
Irrigation Efficiency Code Change (l)	Replace existing code that requires installation of a permanent irrigation system with a code that allows for installation of a temporary irrigation system to establish permanent landscaping	Multifamily, Commercial; Irrigation	New
Landscape Transformation Ordinances (c)	Implement ordinances to encourage water use efficiencies and reduce water needs for outdoor irrigation and other goals through regionally appropriate landscapes with an emphasis on landscape functionality (Implementation of this option could include implementing turf grass area, irrigated area, and/or irrigation area limitations)	All; Irrigation	New
Landscape Transformation Incentives (d, e)	Implement incentives to encourage water use efficiencies and reduce water needs for outdoor irrigation and other goals through regionally appropriate landscapes with an emphasis on landscape functionality (implementation of this option could include increasing WaterWise landscape rebates for residential and multifamily and implementing a new WaterWise landscape rebate for commercial)	All; Irrigation	Existing
Water Loss Control Utility Side (a)	Enhance current utility –side water loss control programs	System Wide; Nonrevenue Water	N/A

Figure 4: Preliminary Demand Management Options (2 of 2).
(Source: City of Austin, Austin Integrated Water Resource Planning Community Task Force, 2017)

The primary purpose of Austin's IWRP is to identify municipal water supply needs over a 100-year time frame based on projected demands and available supplies. The final list of demand-side management strategies will complement various supply-side strategies, which are also undergoing an extensive vetting process. This comprehensive portfolio of strategies is designed to address the gap between the city's contracted water supply and future water demands through 2115. Currently, the City of Austin has a water supply of 325,000 acre-feet per year, all of which the city draws from the Lower Colorado River (City of Austin, 2013; City of Austin, 2010). This water supply represents both senior water rights issued by the Texas Commission Environmental on Environmental Quality (TCEQ) and a firm water back-up secured through an agreement with the Lower Colorado River Authority (LCRA) in 1999. To further supplement municipal water supply, the City of Austin contracted with LCRA in 2007 to provide an additional supply of 250,000 acre-feet per year through 2100. This additional supply, however, will be planned and purchased incrementally as municipal demand increases.

While the 325,000 acre-feet per year firm water supply represents nearly double Austin's peak annual municipal pumpage (173,707 acre-feet in 2006), preliminary climate-adjusted modeling of future demands indicates Austin's water supply needs in 2115 will exceed the city's current contract by as much as 253,801 acre-feet per year (City of Austin, 2017). Although this figure could likely change as the IWRP planning process continues to evolve, this figure underscores the severity of water shortages faced by the city in the coming decades, especially during periods of extreme drought. Expanding future supply through demand-side strategies, as outlined above, is the first prong to tackling these shortages. Since the IWRP is still in the early stages of development, however, it is too early to say how exactly the city will implement these strategies, most of which are ordinance- and incentive-oriented. *How robust will these ordinances and incentive programs be? How far will the scope of these ordinances and incentive programs extend?* Given the complexity and uncertainty of the city's water future, it is critical for the city to explore other regulatory mechanisms to complement these strategies.

Water conservation pricing, for instance, offers utilities the ability to integrate conservation goals directly into their financial framework through various pricing mechanisms. These pricing signals can be in the form of volumetric block rates (customers using less water are charged a lower rate compared to those who use more), excess use rates (e.g., water budget rates—if customers go over their individualized water budget, they are charged a higher volumetric rate), and seasonal rates (customers in the upper block usage or excess-use commercial customers are assessed additional charges during summer months) (TWDB, 2004). Through conservation pricing, utilities can establish water rates that better reflect the actual costs of service while influencing customer usage patterns by signaling to customers when their monthly consumption fluctuates significantly. The City of Austin adopted conservation pricing back in 2012 and charges customers according to a tiered volumetric rate structure. The table below provides the various charges associated with each billing tier, including examples of monthly consumption with corresponding percent increases in usage and bills.

Billing Tier (gallons)	Water Billed (gallons)	Standard Charge	Fixed Charge	Volume Charge (per 1,000 gallons)	Total	% Increase in Usage	% Increase in Amount Billed
0 - 2,000	2,000	$7.10	$1.25	$3.18	$14.71	-	-
2,001 - 6,000	4,000	$7.10	$3.55	$5.05	$30.85	100%	110%
6,001 - 11,000	8,000	$7.10	$9.25	$8.56	$84.83	100%	175%
11,001 - 20,000	16,000	$7.10	$29.75	$12.92	$243.57	100%	187%
20,001 - over	32,000	$7.10	$29.75	$14.43	$498.61	100%	105%

Table 1: Austin's Water Rate Structure for Residential Customers. (Source: Austin Water, 2017)

As the table above illustrates, when consumption doubles, the amount billed increases at a faster rate, and from tier to tier, this percent increase grows even larger. For the highest tier, however, a less aggressive pricing signal is sent to the high water users because the percent increase in water rates drops from 187% to 105%. Though the percent increase volumetric charge from Tier 4 to Tier 5 may have less of an impact on customer behavior, utilities must also be careful not to assess excessive rates to the highest water users because this could pose legality issues—in most cases, municipalities are prohibited from imposing fees that exceed the true cost of providing the service. An alternative to Austin's increasing block rate structure would be seasonal rates based on a year-round block rate structure with higher block rates during the summer months (TWDB, 2014). This approach would convey an even stronger pricing signal to customers, especially during the time of year when municipal demands are at their highest. In addition to water rates, utilities generate revenue from water impact fees, which represent another area in which utilities can incorporate conservation objectives into their financial framework.

Unlike water conservation pricing, which has the potential to influence both existing and new customers, impact fees apply strictly to new development. The purpose of these charges is to cover the direct costs (e.g., constructing transmission lines, installing/purchasing meters) of connecting to a utility's water supply system as well as the infrastructure and additional water capacity necessary for accommodating growth (Nuding et al, 2015). Since state statutes and regulations dictate the extent to which municipalities can assess impact fees, these fees vary significantly from place to place, especially in terms of how they are calculated and how much a city can impose on new development. While water impact fees are a commonly used financial tool designed to help utilities pay for new growth, rarely do these fees target water-efficient development. Recent research, however, has highlighted a growing trend of municipalities designing their impact fees to better reflect the fiscal impacts of connecting new development to water and wastewater systems and to also incentivize development patterns with fewer water demands.

In a 2015 report published by Western Resource Advocates, Ceres, and University of North Carolina Environmental Finance Center, the water impact fee structures of 800 communities in Georgia, North Carolina, Arizona, Colorado, and Utah were surveyed. For a many of the communities evaluated in this study, single family properties with standard-sized residential meters were charged a uniform rate regardless of size or outdoor landscaping requirements. There were, however, a handful of communities using a development's estimated water use to determine a proportional impact fee. To inform this assessment, factors influencing demand were taken into account, including the size of the lot/irrigated areas, application of water efficient fixtures, and the size of the home. In some instances, municipalities were also using impact fees to shape future water demand through water-saving incentives, such as drought-resistant landscaping versus traditional turfed grass. Using these insights as a guide, *could the City of Austin re-structure its water impact fees to achieve its conservation goals?* In the next section, the regulatory, political, and financial feasibility of applying this strategy to the City of Austin are discussed in depth.

Chapter 3: Analysis

Impact Fees in Texas

As a financial tool, water impact fees are grounded in the concept that growth should pay for itself—in other words, new development should incur the costs of connecting to the water system, and these fees should be calculated proportionate to the development's impact on water delivery and supply services. Doing so helps shift the costs of providing new or expanded services away from existing customers. Municipalities impose impact fees to help pay for a number of different public facilities and services in addition to water, including storm/sewer, roads, parks, libraries, and schools. Hand-in-hand with comprehensive plans and capital improvement plans, impact fees play an important role in "ensuring adequate infrastructure to accommodate growth where and when it is anticipated" (American Planning Association, 1998). The statutes regulating impact fees vary state by state, and notable differences include the type of impact fees municipalities can levy and the procedures they must follow when calculating the fees.

In 1987, Texas became the first state to adopt legislation enabling the exaction of impact fees. In order to implement an impact fee program, Texas municipalities must adhere to the processes and requirements outlined within the Texas Local Government Code. As established by this code, the first phase of impact fee development requires a municipality to acquire approval of its land-use assumptions and comprehensive capital improvement plan (Gaines, 2007). These land use assumptions represent projected population and employment growth as well as future land use trends over a 10-year horizon. These urban growth characteristics provide the basis for estimating the future water demand attributable to new growth. The capital improvement plan identifies and prioritizes the long-term capital infrastructure needs of a city. These capital projects inform the projected system impact costs attributable to new growth. After obtaining approval of the land use assumptions and capital improvement plan, municipalities can begin the task of calculating the maximum allowable impact fee (MAF), which is set forth in a proposed impact fee ordinance. Once approved, the impact fee ordinance goes into effect for five years, and the established collection fee applies to all land platted at the time of the ordinance's adoption and any time thereafter (land platted earlier is assessed an impact fee in accordance to prior fee schedules). Texas code requires regular updates to land use assumptions, capital improvement plans, and MAF calculation every five years.

The MAF determination is the driving force behind the impact fee ordinance because it distills all of the information presented in the land use assumptions and capital improvement plan into a 'dollars per service unit' value. The methodology used by cities to develop this value is the basis for their regulatory authority and essentially gives them teeth to impose the impact fees. To evaluate water demand and system capacity, this methodology utilizes a metric known as a service unit (sometimes referred to as living unit equivalent/LUE or equivalent dwelling unit/EDU), which is defined as follows:

> A standardized measure of consumption, use, generation, or discharge attributable to an individual unit of development calculated in accordance with generally accepted engineering or planning standards and based on historical data and trends applicable to the political subdivision in which the individual unit of development is located during the previous 10 years.
>
> (Source: City of Austin, 2013)

To put this into perspective, a standard single-family home typically requires 5/8-inch meter, which equates to 1 service unit (per Austin's meter size schedule). Alternatively, a 100-unit multi-family housing building typically requires a 4-inch meter, which equates to 27.11 service units. During the development of the land use assumptions, the estimated number of new service units added to the system over the 10-year planning period is calculated using historic municipal water pumpage, predicted per capita usage, and forecasted population and employment growth across the water system's service areas. To calculate the (MAF), these new service units are then divided into the costs of capital projects associated with this new growth (City of Austin, 2013). The method for calculating the allowable impact fee is quite complex and cumbersome, but can be summarized by the following steps:

1. Determine capacity of capital projects in service units and cost per service unit;
2. Determine future demand (drawn-down capacity) for each project in service units for the 10-year planning period;
3. Determine the impact project cost attributable to new growth by multiplying the cost per service unit (step 1) by the planning period demand (step 2);
4. Determine the MAF in cost per service unit by dividing the summation of the system-wide impact costs (step 3) by the total number of projected service units for the 10-year planning period.

   (Source: City of Austin, 2013)

Since new growth users will also be contributing to capital improvement costs in the form of monthly rate payments, cities have the option of completing a credit calculation analysis to determine these utility service revenues or apply a 50% revenue credit to total impact costs. To adjust for this, the system-wide impact costs are reduced by the corresponding rate revenue credit. In the table below, Austin's most recent impact fee calculations are provided as an example of these calculations. In this example, Austin performed a credit calculation analysis to demonstrate the revenue generated by its service rates only covered 35% of the total projected costs of implementing capital improvements.

10-Year growth users (in service units)	70,292
System-wide impact costs	$591,088,000
Calculated rate revenue credit (35%)	-$210,461,000
Resultant amount to be used for calculating maximum allowable fee	$380,627,000
Maximum allowable impact fee (in dollars/service unit)	$5,415

Table 2: City of Austin Maximum Allowable Impact Fee.
(Source: City of Austin, 2013)

A MAF represents a cap on the total amount that can exacted from new development to pay for the costs of connecting to the system—however, municipalities can choose to collect a smaller portion of this fee. The type of fee schedule implemented by a municipality depends largely on local context: condition of the water system (i.e., does the city face substantial and immediate capital improvement needs?), development patterns (i.e., Is the city interested in driving growth to different parts of the community?), politics (i.e., Would residents disfavor higher impact fees? Do other nearby cities charge higher/lower rates?), population trends (i.e., Is the city experiencing rapid population growth?) and regional climate and topography (i.e., Is the city's water supply vulnerable to the impacts of drought?). A survey of water and wastewater impact fees adopted by 16 communities in Texas, largely located in the central Texas region, reveals impact fees can vary quite significantly, as the figure below shows.

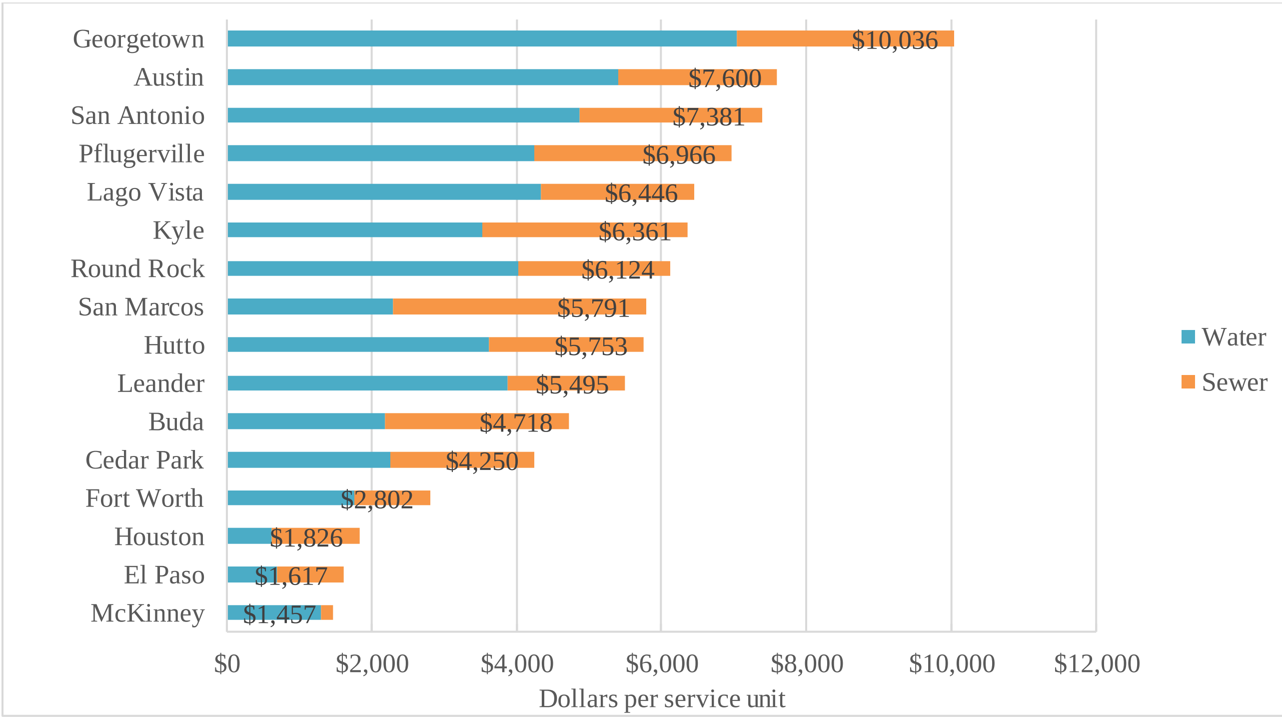

Figure 5: Comparison of Combined Water/Wastewater Impact Fees Across Texas. (Source: City of Georgetown, 2015; City of Austin, 2013; City of San Antonio, 2014; City of Lago Vista, 2016; City of Kyle, 2016; City of Round Rock, 2015; City of San Marcos, 2013; City of Hutto, 2012; City of Leander, 2012; City of Buda, 2010; City of Cedar Park, 2009; City of Fort Worth, 2016; City of Houston, 2017; City of El Paso, 2014; City of McKinney, 2016)

Nearly all the Central Texas cities listed in the figure above have adopted uniform fee structures that assess 100% of the MAF, with the exception of Leander (95%) and Austin (99%, due to rounding down the MAF). Of the Central Texas cities, San Antonio is the only one that does not impose a uniform fee structure. Instead, the city's impact fees vary by service areas, which reflect different pressure zones and watersheds. San Antonio's water system relies upon diverse sources of water, including the Edwards Aquifer, Carrizo Aquifer/aquifer storage and recharge, and brackish groundwater desalination. Due to these unique characteristics, the city has adjusted its impact fees to better account for the capital costs needed to deliver water to various parts of the city. Up until its last impact fee update in 2013, Austin had also implemented a zone-based impact fee structure, though for different objectives. Austin's previous fee structure divided the city into seven zones according to two development types: desired development and drinking water protection. To encourage development in certain areas of the city, the city established four incentive areas with reduced impact fee requirements (as low as 22% of the MAF). For the remaining three zones, the city assessed higher fees (upwards of 75% of the MAF) to help reduce the impacts of development in these environmentally-sensitive parts of the city.

Unlike cities in the Central Texas region, the four other cities (Forth Worth, Houston, El Paso, and McKinney) not only collected significantly lower impact fees, but most also imposed non-uniform fee structures. For example, El Paso assessed different impact fees for each of the water system's three service areas, and collected fees that represented 41 to 69% of the city's MAF. Fort Worth, on the other hand, assessed fees that represented 44% of the MAF in the first year of implementation, but these fees are set to rise at a fixed rate over the next two years, at which point the impact fees will reflect 80% of the city's MAF. Of these four cities, McKinney was the only one that collected 100% of the MAF pursuant to a uniform fee structure. Surprisingly, other communities in the Dallas-Fort Worth metropolitan areas, including Dallas, Plano, Irving, and Garland do not even require water and wastewater impact fees.

The decision to collected impact fees lower than the MAF or not require them altogether can be explained for several reasons. First, impact fees are sometimes viewed as a deterrent to new development, and considering the Dallas-Fort Worth area has been experiencing significant population and economic growth in the last decades, these communities likely chose to subsidize the costs of new growth through other revenue streams as a way of reducing potential barriers to construction. Second, residents may have voiced opposition to proposed increases to impact fees. In fact, during Fort Worth's most recent impact fee update cycle, local developers expressed concern over the surge in combined fees and the impacts this would have on the city's development market (Baker, 2016). To help mitigate these financial pressures, the city chose to gradually raise the impact fee over a three-year period. The same can be said of El Paso, which proposed a fee update that would have doubled the city's combined water/wastewater impact fees from the 2009 to 2014 impact fee cycles. Local builders and developers, however, expressed disapproval of the increase, including concern that growth projections supporting the fee calculations were exaggerated (KVIA, 2014). Ultimately, El Paso city council opted to not move forward with an updated fee resolution.

Third, cities may fear legal repercussions against their impact fee ordinance. The regulatory authority afforded to municipalities to impose impact fees depends on the city's ability to demonstrate the capital costs associated with new growth "in accordance with generally accepted engineering or planning criteria" (State of Texas, 2011). In addition to outlining the procedures for calculating fees, Texas Local Government Code also establishes specific methodology municipalities must use to derive these estimations. Despite this prescriptive framework, a considerable amount of data assumptions go into estimating future demand. For that reason, cities may decide to impose impact fees representing a portion of the MAF to compensate for potential error and avoid lawsuits alleging excessive fee exaction. For example, Austin's 2007 impact fee ordinance approved fees that were 75% or less of the MAF. In its resolution, the city highlighted the uncertainties surrounding impact fee calculations as the primary rationale for not recommending the MAF (Austin, 2007). To this same point, several other Central Texas cities also collected less than 100% of the MAF in previous impact fee cycles—however, many of these cities have since updated their ordinances to capture 100% of the MAF. For this change to occur, it is likely the financial stresses created by new development outweighed the risk of potential litigation. By opting for the full MAF, significant fee increases can occur from one cycle to the next.

To further illustrate the unique dynamics that play into impact fee structuring, it is useful to look at how much impact fees have changed over time. In the table below, the percent change in combined water/wastewater impact fees is described. These fluctuations occurred over the last two to three cycles, depending on the municipality.

City	Percent Change	Time Frame
Austin	223%	2008 to present
Fort Worth	218%	2010 to present
Lago Vista	158%	2007 to present
Georgetown	93%	2007 to present
San Antonio	55%	2005 to present
Kyle	47%	2006 to present
Pflugerville	45%	2002 to present
San Marcos	25%	2007 to present
Buda	24%	2008 to present
Round Rock	9%	2006 to present
Hutto	6%	2005 to present
Leander	4%	2007 to present
El Paso	0%	2005 to present
McKinney	-9%	2008 to present

Table 3: Percent change in impact fees for Texas cities. (Source: City of Georgetown, 2015; City of Austin, 2013; City of San Antonio, 2014; City of Lago Vista, 2016; City of Kyle, 2016; City of Round Rock, 2015; City of San Marcos, 2013; City of Hutto, 2012; City of Leander, 2012; City of Buda, 2010; City of Fort Worth, 2016; City of El Paso, 2014; City of McKinney, 2016)

All but two of these cities experienced an increase in their impact fees over the last 10 years. The most notable increases took place in Austin, Fort Worth, Lago Vista, and Georgetown. These drastic hikes are the result of several factors, including: population growth, fee structure adjustments, mounting infrastructure needs, and/or decreasing revenue stability from water rates. Despite these trends, all of these Texas cities collect fees that fall below the 2015 national average ($7,732) except for one, Georgetown (Mullen et al, 2015). This is because Texas' legal framework is far more restrictive in comparison to states with some of the highest impact fees, such as California, Arizona, Colorado, Virginia, Maryland, and Ohio. Unlike these other states, Texas' legislation guiding impact fee calculation is very prescriptive in nature, and as such, it poses limitations on the leveraging of higher impact fees (Ross, 1991). Unless a municipality can show how much of its revenue from service rates goes towards covering the costs of capital improvements, they must apply the 50% rate revenue credit. This credit essentially places a cap on the MAF, even if a larger portion of a utility's revenue from impact fees goes towards covering capital costs. For example, the City of Georgetown charges a combined fee of $10,036 for a single-family residence, one of the highest in Texas; whereas the City of Paso Robles, California charges $34,400 and the City of Boulder, Colorado charges $15,940 (City of Paso Robles, 2016; City of Boulder, 2014). Although Texas legislation is quite prohibitive, it does provide municipalities ample discretion to design fee structures as they see fit, so long as the assessed fee falls below the MAF.

Using impact fee structures to influence patterns of development represents a very advantageous opportunity for municipalities, so long as these pricing mechanisms do not undermine a utility's overall revenue requirements. As previously described, up until its last impact fee update, the City of Austin utilized an incentive-based fee structure to encourage development in certain areas of the city. Not only does this strategy assist cities in achieving goals set forth in their comprehensive plan, but depending on the intended outcome, it has the added benefit of addressing the concerns of diverse stakeholders. When Austin implemented ‘desired development zones’ and ‘drinking water protection zones’ in their previous impact fee update, this strategy served to advance the city’s comprehensive planning goals (City of Austin, 2007). More than that, environmentally-focused groups and residents in Austin could easily rally behind this strategy because its overall objective is to ensure protection of environmentally-sensitive areas. From the perspective of the developer and builder, this strategy is equally appealing because it helps to cut down on their costs and allow for a better return on investment. Granted the nuances behind these intended outcomes are not as cut and dry, impact fee design has the potential to resonate with competing groups in different capacities. Although Austin abandoned this fee structure in its last impact fee update, the city can utilize a similar strategy to help subsidize the costs of water-efficient patterns of growth. This is an especially opportune moment because the city is currently in the process of developing its 2018 update. As the city works to approve a new impact fee structure, it can use this opportunity to seek policies that align with the goals of the *Water Forward* planning process while simultaneously appeasing a diverse group of stakeholders. The next section describes the specific ways Austin can tailor its impact fee structure to encourage water-efficient patterns of development, how these can be applied, and to what extent they are legally and politically feasible.

LEVERAGING IMPACT FEES TO ENCOURAGE WATER-EFFICIENT GROWTH

How much a new development pays in impact fees is determined solely by the meter size required by the building. Meter size varies depending on the land use type and size of the building. Once a meter type and size are selected, the service unit equivalent and appropriate impact fee can be determined. The table below describes different land use types and their corresponding meter types, sizes, and service unit equivalents.

Typical Land Use	Meter Type	Meter Size	Service Unit Equivalent
Single Family Residential	Simple	5/8” & 3/4”	1
Single Family Residential	Simple	1"	1.7
Single Family Residential	Simple	1-1/2”	3.3
Single Family Residential	Simple	2”	5.3
Comm./Retail	Compound	2”	5.3
Comm./Retail	Turbine	2”	6.7
Comm./Retail/Multi Family	Compound	3”	10.7
Comm./Retail/Multi Family	Turbine	3”	16
Comm./Retail/Multi Family	Compound	4”	16.7
Comm./Retail/Multi Family	Turbine	4”	28
Industrial	Compound	6”	33.3
Industrial	Turbine	6”	61.3
Industrial	Compound	8”	53.3
Industrial	Turbine	8”	106.7
Industrial	Compound	10”	153.3
Industrial	Turbine	10”	166.7
Industrial	Turbine	12”	220

Table 4: Service Unit Equivalent by Meter Size, Type, and Land Use. (Source: City of McKinney, 2013)

To an extent, the type of meter selected for a development can reflect a building’s overall water intensity—turbine meters offer high flow applications while compound meters serve buildings with more variable water use—however, water use profiles (i.e., end uses, peak demands) for commercial, multi-family, and industrial customers can vary quite substantially, and these differences are not fully captured by service unit equivalents alone (AWWA, 2009). Moreover, standard single-family homes require a 5/8-inch or 3/4-inch meter size, but depending on the number of occupants, size of the home, type/area of outdoor landscaping, etc., total water consumption will also vary quite substantially across households. Because meter size alone does not reflect the actual water demands of different land use types, the capital costs of water service expansion necessitated by new development cannot be accurately identified (Nuding et al, 2015).

To better account for water use behaviors across different land use types, impact fees can be based on other factors that more accurately reflect water demand. These factors can include: building area, number of bathrooms/fixtures, size of irrigated area, type of landscaping, predicted usage charts (used for estimating peak demand—e.g., peak gallons per customer seat for restaurants and peak gallons per bed for hotels) (Nuding et al, 2015). These factors provide a more precise indicator of both indoor and outdoor water use. Despite the usefulness of these parameters in more accurately portraying water demands, and thus associated capital costs, incorporating them into Austin's impact fee design would be quite challenging, if not altogether impossible. Given the prescribed methodology established by Texas Local Government Code for calculating impact fees, little leeway exists to change the metrics for making these calculations. The code requires impact fees to be calculated on a 'dollar per service unit' basis "in accordance with generally accepted engineering or planning standards and based on historical data and trends" (State of Texas, 2011).

It is possible for the city to mine its water usage history and parcel data to determine the average volume of water consumed by a standard single-family residence. This measure could then be used to calculate service unit equivalents based on both indoor and outdoor water demand factors (e.g., square footage of the home, size of the irrigated lawn) according to different thresholds (e.g., houses smaller than 2,000 square feet; houses between 2,000 and 4,000 square feet; and houses larger than 4,000 square feet). Similar calculations would also have to be done for multi-family, commercial, and industrial buildings using the base consumption of a single-family home as a standard of measure. However, establishing service unit equivalents and thresholds for commercial and industrial buildings would be incredibly difficult because water use in these sectors varies enormously depending on the segment type. The table below provides the average water intensities of various commercial and industrial facilities to illustrate this variability in water use.

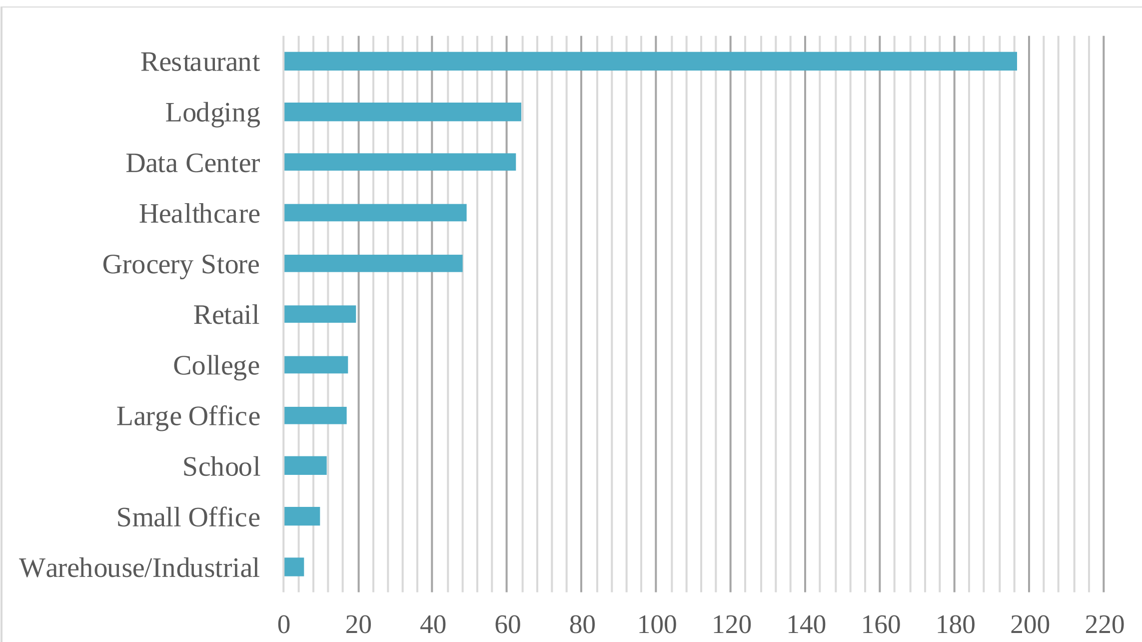

Figure 6: Water Use Intensity of Commercial and Industrial Building Types (gallons per square foot per year).
(Source: Nuding et al, 2015)

In theory, since impact fees are charged at the time a developer obtains a building permit, the city would have the information necessary to calculate an impact fee based on building size, size of irrigated landscaping, and other parameters. As a matter of practice, though, the analysis required to support these methodologies would have to be incredibly robust to remain consistent with Texas Local Government Code and withstand any potential threat of litigation, given the abundance of data assumptions involved. A divergence from the established framework for calculating the MAF seems an unlikely alternative for the City of Austin. Providing better means to capture water demand variability in impact fee assessment is critical to encouraging water-efficient growth and minimizing future water infrastructure needs and costs, but state legislation makes this very difficult, if not altogether impossible. Alternatively, a more pragmatic and advantageous avenue for influencing the water profiles of new development is through the implementation of these impact fees, rather than their calculation.

For the City of Austin, the greatest opportunity to promote conservation goals in impact fee assessment is in how the fees are structured for each customer class. This can be best achieved through incentive-based pricing—similar to the tactic previously adopted to increase development capacity in certain parts of the city. For the purpose encouraging conservation, the fee structure could offer various incentives designed to reduce future water demands of new development. These incentives, in the form of fee reductions, could be provided to developers in exchange for the following:

- Opting not to install permanent, in-ground irrigation systems[3];
- Selecting outdoor landscaping with low water requirements and/or xeriscaping;
- Implementing rainwater capture systems on-site;
- Integrating graywater systems into indoor plumbing;
- Tapping into the water reuse system for non-potable consumption.

[3] Future homeowners would also be restricted from installing an irrigation system. The feasibility of enforcing this restriction is discussed in a later section.

The incentives listed above focus almost exclusively on outdoor water consumption. As plumbing codes have evolved over the last couple decades, water-efficient indoor fixtures have not only become increasingly effective, but also widely prevalent, especially in new development. This, coupled with the expanding market absorption of WaterSense labeled products, makes most indoor-based incentives futile because these changes are already taking place regardless of incentive-driven intervention. The figure below describes the transformation of water-efficiency standards over the past 30 years.

Water Consumption by Water-Using Plumbing Products and Appliances - 1980 to 2012

Water-using Fixture or Appliance	1980s Water Use	1990 Requirement	EPAct 1992 Requirement	2009 Baseline Plumbing Code	2012 'Green Code' Requirement	% Reduction in avg water use since 1980s
Residential Bathroom Lavatory Faucet	3.5+ gpm	2.5 gpm	2.2 gpm	2.2 gpm	1.5 gpm	57%
Showerhead	3.5+ gpm	3.5 gpm	2.5 gpm	2.5 gpm	2.0 gpm	43%
Toilet - Residential	5.0+ gpf	3.5 gpf	1.6 gpf	1.6 gpf	1.28 gpf	74%
Toilet - Commercial	5.0+ gpf	3.5 gpf	1.6 gpf	1.6 gpf	1.6 gpf[1]	68%
Urinal	1.5 to 3.0+ gpf	1.5 to 3.0 gpf	1.0 gpf	1.0 gpf	0.5 gpf	67%
Commercial Lavatory Faucet	3.5+ gpm	2.5 gpm	2.2 gpm	0.5 gpm	0.5 gpm	86%
Food Service Pre-rinse Spray Valve	5.0+ gpm	No requirement	1.6 gpm (EPAct 2005)	No requirement	1.3 gpm	74%
Residential Clothes Washer	51 gallons/load	No requirement	26 gallons/load (2012 standard)	No requirement	16 gallons/load	67%
Residental Dishwasher	14 gallons/ cycle	No requirement	6.5 gallons/cycle (2012 standard)	No requirement	5.0 gallons/cycle (ASHRAE S191P)	64%

Figure 7: Evolution of Water Efficiency in Plumbing Standards.
(Source: Alliance for Water Efficiency, 2014)

Outdoor water use, on the other hand, is an optimal focal point for these incentive-based conservation objectives for three reasons: 1) outdoor water use represents a significant portion of the city's overall demands; 2) reducing potable water use through decreased outdoor demands or alternative sources of non-potable water is fundamental to city-wide conservation goals; and 3) a majority of the alternative water projects (recycled water, graywater, and rainwater) require considerable initial investment from the developer, so incentives can be quite effective if offered prior to groundbreaking.

To inform the city's implementation of these incentives, it is helpful to take a closer look at Austin's historic and predicted water use, including demand profiles for single family residential, multi-family residential and commercial. As evidenced in the graph below, single-family residential historically represents the largest portion (35.6%) of Austin's total municipal water use.

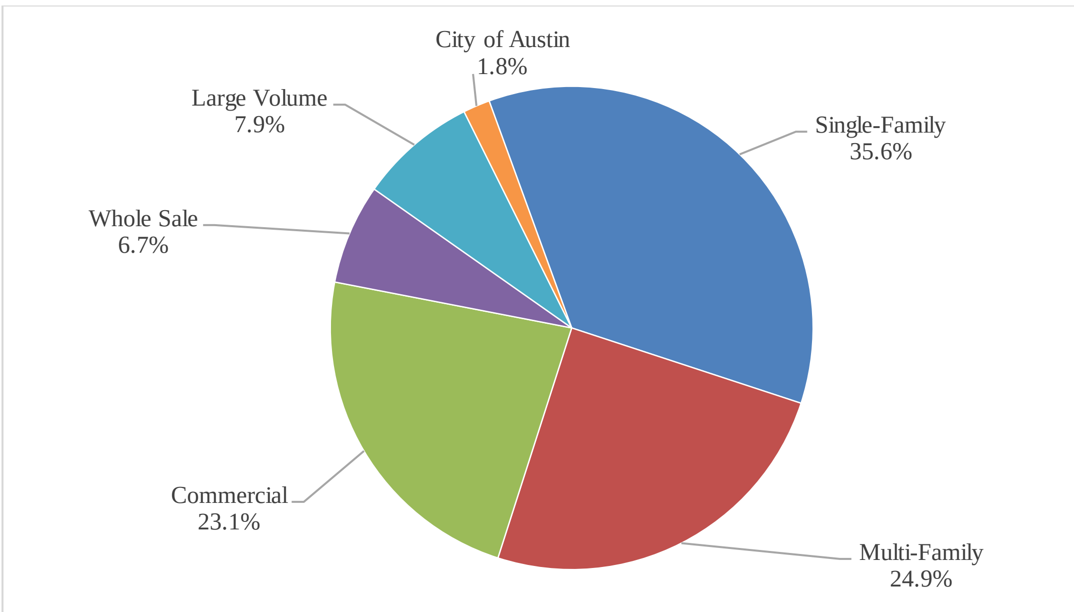

Figure 8: Average Consumption by Sector (2013-2015)
(Source: City of Austin, 2017)

A breakdown of indoor and outdoor consumption, however, reveals variability in outdoor watering behavior across single-family, multi-family, and commercial customer classes. The commercial sector, for instance, dedicates the largest portion (31%) of its overall consumption to outdoor irrigation whereas multi-family customers use the smallest share (16%). Altogether, outdoor water use represents 22% the city's total consumption average between 2013 and 2015.

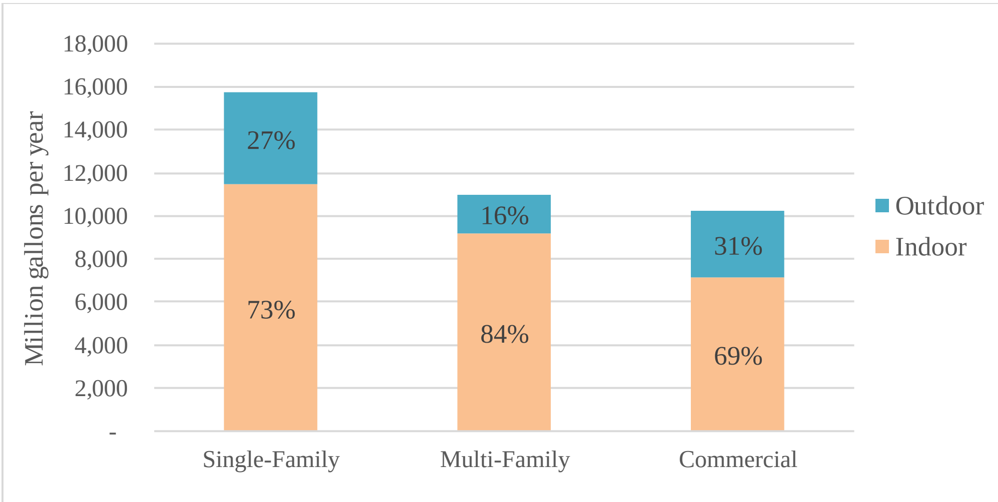

Figure 9: Indoor and Outdoor Water Use by Sector (2013-2015). (Source: City of Austin, 2017)

According to the IWRP's preliminary projections, Austin's overall water demands are projected to quadruple, while the outdoor use is expected to steadily increase its share of total consumption over the next 100 years (City of Austin, 2017). This trend in indoor and outdoor water usage is the result of various factors, including the passive savings captured by high-efficiency indoor fixtures and appliances combined with the impacts of climate change. Despite the city's population jumping from just under 1 million in 2015 to nearly 4 million in 2115, per capita usage will continue to decline, as the graph below illustrates.

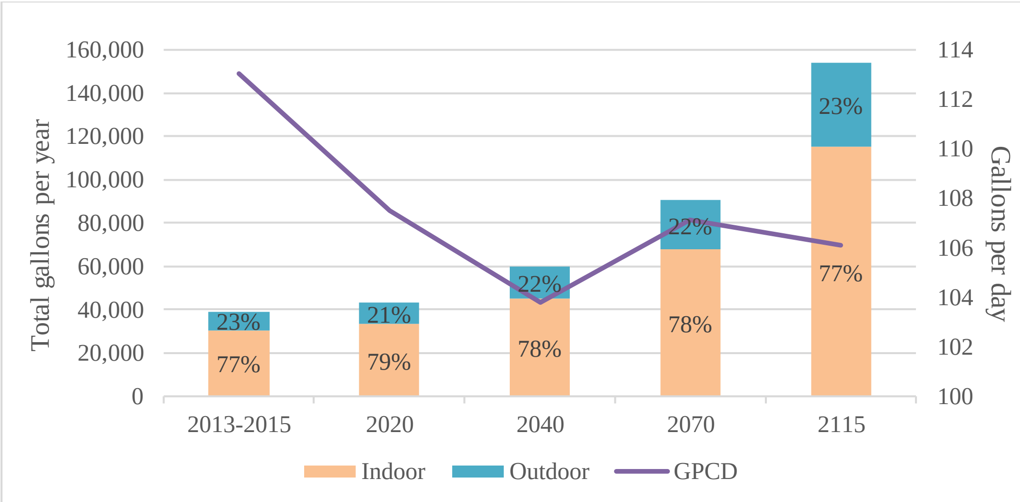

Figure 10: Predicted Indoor and Outdoor Consumption and GPCD. (Source: City of Austin, 2017)

By 2115, outdoor water use as a share of total use is expected to jump from 29% to 35% for commercial customers and 16% to 18% for multi-family customers, but drop from 27% to 26% for single-family customers. Though these shifts may seem insignificant, they translate into a net value of 2.2 billion gallons in 2115 alone. Characterizing Austin's projected trends in outdoor water consumption is necessary for underscoring the potential savings that can be captured by reducing potable water demands from irrigation, especially as outdoor use continues to grow as a percent of total use for many of Austin's customers. The city can, in turn, use this insight as a basis for tailoring an impact fee structure to serve specific conservation goals.

Quantitative Analysis of Conservation-Driven Impact Fee Structures and Estimated Savings

Methodology & Assumptions

Given these current and predicted patterns of municipal demand, what types of conservation-based incentives could the City of Austin incorporate into its impact fee structure, how much of a discount could these financial incentives offer, and to what extent could these incentives impact the city's revenue? To demonstrate what a conservation-based impact fee structure could look like and how effective it could be, an analysis of three incentives types was conducted. These incentives include:

- Reduced impact fees for new residential and commercial developments that choose not install permanent, in-ground irrigation systems;
- Reduced impact fees for new residential and commercial developments that implement on-site rainwater harvesting systems; and
- Reduced impact fees for new residential and commercial developments that connect to the city's water reuse system (i.e., purple pipeline).

For each of these incentives, the water savings potential and total amount of revenue lost as a result of reduced fee collections were estimated over a 10-year period (2020-2030). These estimations were based on historical trends in outdoor water use, population, and service connections as well as IWRP's projections of outdoor water use, population growth, and employment growth. Below is the basic methodology used to determine savings and cost estimations[4]:

[4] Note: Some intermediary steps have been omitted.

- **Number of new service connections**: Estimated for single-family residential, multi-family residential, and commercial customer classes across each year of the analysis period using a simple linear regression model[5];
- **Total number of connections utilizing each incentive mechanism:** Determined using the estimated number of new connections obtained in Step 1 and applying a pre-determined conversion rate (i.e., the percent of new connections expected to seek an incentive);
- **Average annual outdoor water use per connection**: First, average annual outdoor water use per connection was calculated for the period 2013 to 2015. This baseline value was then adjusted every year from 2020 to 2030 according to the rate at which per capita outdoor water usage either increased or decreased in the same year, based on the IWRP's projections of future outdoor water use[6]. Making this adjustment helped to ensure these projections accounted for fluctuations in outdoor water use from one year to the next.
- **Estimated water savings potential:** The total number of connections expected to participate in an incentive measure (Step 2) along with the average annual outdoor water use per connection (Step 3) were then used to estimate the water savings potential in each year.
- **Total water savings potential:** Overall savings were determined by calculating the cumulative savings year-over-year.

[5] Based on a correlation between service connections and population.

[6] The rate of change for single-family residential and multi-family residential use was based on gallons per capita per day, whereas the rate of change for commercial was based on gallons per employee per day.

- **Total Costs/Lost Revenue:** The costs associated with these water savings were determined by evaluating the projected number of connections seeking an incentive and the corresponding impact fee for each customer class and meter size[7].

The steps outlined above represent the core methodology used to develop the savings and costs estimations for each of the three conservation-driven incentives. Key assumptions were also introduced to help guide these calculations. These assumptions include:

- The City of Austin's retail customer classes (e.g., Single Family, Multi-Family, Commercial, and City of Austin) are divided into two types: indoor (domestic) and outdoor (irrigation). Even though irrigation meters are identified for the single family sector, the savings and cost analysis was not based upon this service connection type. This is because not all single-family outdoor water use is captured within these service connections—just because a single-family household does not have an irrigation meter, that does not mean the household is not consuming water for outdoor purposes. Instead, to capture the majority of single family outdoor usage, single family domestic meters were used[8]. Unlike single family, however, multi-family and commercial sites often have separate irrigation meters. Since irrigation meters for these two sectors reflect the majority of outdoor use, these service connections were used in the analysis.
- The water savings potential of each incentive type represents a cumulative, year-over-year total—in other words, the savings captured each year are captured in all subsequent years because these savings represent continued demand reduction year-

[7] The corresponding impact fee was based on the typical share of single-family, multi-family, and commercial connections by meter size.

[8] As discussed previously, single family outdoor use represents 27% of total use, so this value was applied to total single-family use to determine outdoor use.

over-year. The savings estimates in 2020, for instance, are folded into overall savings in 2021, 2022, and so on. Likewise, overall savings in 2028 reflect the combined annual savings for 2020 through 2028[9].

- For the purposes of this analysis, the water impact fee for the 2018 updated cycle was estimated to be $6,750. This estimation represents a 25% increase in Austin's current water impact fee ($5,400). To put this into perspective, the city's water impact fee increased by 128% from 2007 to 2013 ($2,200 to $5,400). Although this significant jump is due in large part to the city opting to collect the MAF at 100% beginning in 2013, the 2013 MAF ($5,400) still represents a 64% increase compared to the 2007 MAF ($3,300). Therefore, the 25% increase in the 2018 impact fee update represents a conservative estimate. Moreover, since this analysis covers the span of 2020 to 2030, the impact fee would be updated again in 2023 and 2028. However, in the interest of simplicity and to avoid compromising the findings of this analysis by making further assumptions, the water impact fee of $6,750 remains the same for all years of the analysis. It is also important to note that the analysis evaluates incentives for water impact fees, only. Because the proposed incentive mechanisms involve the use of outdoor water, it did not seem logical to apply these incentives to wastewater too. Reducing the demands associated with outdoor water use does not present benefits to wastewater systems—instead, it would more likely have positive impacts on stormwater flows in instances where there is runoff from irrigation. The City of Austin, however, does not charge stormwater impact fees—instead these costs are captured as drainage charges and applied to monthly utility bills.

[9] Although these savings are cumulative, they are adjusted year-over-year to reflect increasing or decreasing rates of outdoor water use.

- The conversion rates used in the savings and cost estimations represent potential levels of participation for each of the incentive types depending on marketability to the developer and homeowner. It is assumed that the number of new developments seeking an incentive would increase over time as it becomes easier for the building community to implement these incentives. Ideally these values would be grounded in case studies of similar measures, but minimal research has been completed on this subject as it relates to water impact fees[10]. In light of this data gap, this report intends to use these estimated participation levels to demonstrate possible savings outcomes, especially if the city were to aggressively promote these incentives.
- The amount of incentives offered for each conservation-based option must balance several factors: the desirability of the incentive to the builder/developer, the marketability of the water conservation initiative to the homeowner, and the financial security of the municipality. For instance, rainwater harvesting systems for single family households can cost upwards of $8,000 to $10,000 (TWDB, no date). In this analysis, an incentive of $3,375 was offered to help subsidize the costs of installing a system in new single family residential homes. Even though this incentive represents less than half of the total estimated costs to install a rainwater harvesting system, it may represent a desirable enough incentive for developers, especially if it can be easily marketed to the homeowner, who have to assume the remaining costs of the system as part of the home's purchasing price[11]. Although a higher discount rate would be more appealing to the developer and homeowner, the utility has to keep in mind the revenue impacts these incentives would have. In determining the incentive amounts for each

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[10] Although it was not performed as part of this report, it would be extremely beneficial to pull developers into this discussion to get a better sense of how receptive the building community would be to these incentives. Through this research, more sound estimations of conversion rates can be developed.

[11] Texas statute does allow cities to exempt rainwater harvesting systems from property taxes (TWDB, no date).

conservation strategy and meter size, these three factors were taken into consideration. Setting these impact fee structures involved a large degree of ambiguity and unknown, but for the purposes of this analysis, each example seeks to establish conservative incentive discounts aimed at protecting the utility's financial stability and driving market change.

Despite the limitations encountered in this assessment of water savings potential, it should be underscored that the primary purpose of these estimations is to demonstrate how such a fee structure could work and how much savings could be achieved, given the methodology and assumptions described above. As the results of this analysis reveal in the following section, these incentive options can offer reasonably cost-effectiveness opportunities to achieving reduced municipal demand.

Results

Incentive for No Irrigation System

Sector	Number of Service Connections Receiving Incentive	Lost Revenue	Cumulative Savings 2020-2030 (MG)
Single-Family Outdoor	13,642	$23,627,434	1,002
Multi-Family Outdoor	171	$1,144,564	1,115
Commercial Outdoor	635	$4,192,842	2,010
	Total:	**$28,964,840**	**4,127**
	Total Savings (MGD):	**11.31**	
	Total Cost ($/MGD):	**$2,561,813**	

Conversion Rate:
30% - 2020 to 2024
40% - 2025 to 2030

Figure 11: Estimated Savings and Cost for the No Irrigation System Incentive. (Created by M. Bock)

Meter Size	Service Unit Equivalent	Maximum Allowable Impact Fee	Incentive Amount	Impact Fee After Incentive
5/8"	1	$6,750	$1,690	$5,060
3/4"	1.5	$10,125	$2,530	$7,595
1"	2.5	$16,875	$4,220	$12,655
1 1/2"	6.58	$44,415	$11,100	$33,315
2"	8.94	$60,345	$15,090	$45,255
3"	18.98	$128,115	$15,000	$113,115
4"	27.11	$182,993	$15,000	$167,993
6"	56.07	$378,473	$15,000	$363,473
8"	100.74	$679,995	$15,000	$664,995
10"	250	$1,687,500	$15,000	$1,672,500

Figure 12: Impact fee per service unit equivalent.
(Created by M. Bock)

As Figure 11 shows, an impact fee structure that provides an incentive to new development choosing to not install permanent, in-ground irrigation system could save as much as 11.3 MGD between 2020 and 2030 at the cost of $2.5 million per MGD. These savings are based on an assumed conversion rate of 30% between 2020 and 2024 and 40% between 2025 and 2030. According to the proposed fee schedule, a 25% reduction would be offered for all meters sized 2 inches or smaller, after which point the incentive amount would be capped at $15,000 for meters sized 3 inches and larger.

Incentive for Rainwater Harvesting

Sector	Number of Service Connections Receiving Incentive	Lost Revenue	Cumulative Savings 2020-2030 (MG)
Single-Family Outdoor	3,325	$11,503,286	426
Multi-Family Outdoor	42	$562,896	236
Commercial Outdoor	154	$1,909,009	427
	Total:	**$13,975,190**	**1,090**
	Total Savings (MGD):	**2.99**	
	Total Cost ($/MGD):	**$4,679,826**	

Conversion Rate:
5% - 2020 to 2023
10% - 2024 to 2026
15% - 2027 to 2030

Figure 13: Estimated Savings and Cost for the Rainwater Harvesting Incentive. (Created by M. Bock)

Meter Size	Service Unit Equivalent	Maximum Allowable Impact Fee	Incentive Amount	Impact Fee After Incentive
5/8"	1	$6,750	$3,375	$3,375
3/4"	1.5	$10,125	$5,063	$5,062
1"	2.5	$16,875	$8,438	$8,437
1 1/2"	6.58	$44,415	$20,000	$24,415
2"	8.94	$60,345	$25,000	$35,345
3"	18.98	$128,115	$30,000	$98,115
4"	27.11	$182,993	$35,000	$147,993
6"	56.07	$378,473	$40,000	$338,473
8"	100.74	$679,995	$45,000	$634,995
10"	250	$1,687,500	$50,000	$1,637,500

Figure 14: Impact fee per service unit equivalent. (Created by M. Bock)

Figure 13 reveals the estimated savings associated with an impact fee structure providing an incentive to new development for implementing rainwater harvesting could be as much as 3.0 MGD between 2020 and 2030. These savings could be achieved at the cost of \$4.6 million per MGD. The conversion rate assumed for this incentive option was 5% between 2020 and 2023; 10% between 2024 and 2026; and 15% between 2027 and 2030. According to the proposed fee schedule, a 50% reduction would be offered for all meters sized 1 inch or smaller. For meters sized 1.5 inches or larger, the incentive would start out at \$20,000 and would continue to increase at an incremental rate of \$5,000 for each meter size thereafter.

Incentive for Water Reuse

Sector	Number of Service Connections Receiving Incentive	Lost Revenue	Cumulative Savings 2020-2030 (MG)
Single-Family Outdoor	6,453	\$22,324,578	949
Multi-Family Outdoor	81	\$662,928	528
Commercial Outdoor	301	\$2,267,282	952
	Total:	**\$25,254,787**	**2,429**
	Total Savings (MGD):	**6.66**	
	Total Cost (\$/MGD):	**\$3,794,280**	

Conversion Rate:
15% - 2020 to 2023
20% - 2024 to 2027
25% - 2028 to 2030

Figure 15: Estimated Savings and Cost for the Water Reuse Incentive. (Created by M. Bock)

Meter Size	Service Unit Equivalent	Maximum Allowable Impact Fee	Incentive Amount	Impact Fee After Incentive
5/8"	1	$6,750	$3,375	$3,375
3/4"	1.5	$10,125	$5,063	$5,062
1"	2.5	$16,875	$7,500	$9,375
1 1/2"	6.58	$44,415	$10,000	$34,415
2"	8.94	$60,345	$12,500	$47,845
3"	18.98	$128,115	$15,000	$113,115
4"	27.11	$182,993	$17,500	$165,493
6"	56.07	$378,473	$20,000	$358,473
8"	100.74	$679,995	$22,500	$657,495
10"	250	$1,687,500	$25,000	$1,662,500

Figure 16: Impact fee per service unit equivalent.
(Created by M. Bock)

As shown in Figure 15, an impact fee structure that provides an incentive to new development opting to connect to the purple pipeline for outdoor irrigation use could save as much as 6.7 MGD between 2020 and 2030 at the cost of $3.7 million per MGD. These savings are based on an assumed conversion rate of 15% between 2020 and 2023; 20% between 2024 and 2027; and 25% between 2028 and 2030. According to the proposed fee schedule, a 50% reduction would be offered for meters sized 5/8 inch and 3/4 inch. For meters sized 1 inch or larger, the incentive would start out at $7,500 and continue increasing at an incremental rate of $2,500 per meter size thereafter.

Summary

Sector	Total Projected Demand 2020-2030 (MG)	Demand with Irrigation System Incentive (MG)	Demand with Rainwater Harvesting Incentive (MG)	Demand with Water Reuse Incentive (MG)
Single-Family Outdoor	51,414	50,427	50,988	50,480
Multi-Family Outdoor	22,374	21,199	22,137	21,815
Commercial Outdoor	37,384	35,402	36,956	36,446
Total Outdoor	111,171	107,027	110,081	108,741
Total Demand Reduction (MGD):		**11.35**	**2.99**	**6.66**
Percent Demand Reduction:		**-3.7%**	**-1.0%**	**-2.2%**

Figure 17: Summary of Total and Percent Demand Reduction for each Incentive Option.
(Created by M. Bock)

In the figure above, demand reduction estimates for each of the incentive options are summarized by total reduction (in million gallons per day) as well as percent reduction. Overall, the incentive offered to new development opting to not install permanent, in-ground irrigation systems achieved the greatest amount of savings. This is due in large part to the higher conversion rate that is expected for this type of incentive versus a rainwater harvesting or water reuse incentive. It is important to note that the percent demand reduction value is relative to the total amount of outdoor water use across the single family, multi-family, and commercial customer classes. Although these savings may seem non-significant from the system-wide perspective, it is helpful to evaluate these incentives in terms of cost per MGD saved to see how they stack up against more traditional municipal conservation programs types.

Utility Name	Service Population	Sales (MGD)	Conservation Portfolio				Key Performance Indicators		
			Budget ($)	Savings (MGD)	Time Horizon	Program Strategy	% Savings	$/MGD	$/MGD per Resident
Seattle Public Utilities/Saving Water Partnership, WA	1,300,000	118.4	$10,683,000	3.21	2007 to 2010	Hardware Incentives (RES Indoor, Landscape, COM Non-Landscape) Education/awareness	2.70%	$3,328,037	~ $2.56
Cary, NC	135,000	16.2	N/A	0.08	2009 to 2013	HET Rebate Program Turf Buy Back	0.50%	N/A	N/A
Denver Water, CO	1,300,000	180	$2,557,766	1.08	2014	Education & Outreach Rebates & Incentives	0.60%	$2,363,916	~ $1.82
Hillsborough County, FL	842,395	N/A	$7,260,382	1.46	1996 to 2014	RES Indoor/Outdoor COM Indoor	N/A	$4,972,864	~ $5.90
Tampa Water Department, FL	588,000	N/A	$2,684,722	0.63	1996 to 2014	RES Indoor/Outdoor COM Indoor	N/A	$4,261,463	~ $4.57
St. Petersburg, FL	250,000	N/A	$4,420,604	2.11	1996 to 2014	RES Indoor/Outdoor COM Indoor/Outdoor	N/A	$2,095,073	~ $8.38
Austin, TX	880,187	150.3	$15,200,541	2.68	2009 to 2011	RES Indoor/Outdoor COM Indoor/Outdoor	1.80%	$5,669,157	~ $6.44
San Antonio Water System, TX	1,743,559	134	$9,250,000	1.95	2015	RES Indoor/Outdoor COM Indoor/Outdoor	1.50%	$4,733,363	~ $2.71
Sunset Valley, TX*	700	0.2	$23,000	0.0032	2017	RES Indoor/Outdoor	1.60%	$1,883,438	~ $2,690.63
Scottsdale, AZ*	226,000	61	$175,000	0.06	2017	RES Indoor/Outdoor COM Indoor/Outdoor	0.10%	$985,683	~ $4.36
Prescott, AZ*	40,000	5.8	$35,000	0.0032	2017	RES Indoor/Outdoor COM Indoor/Outdoor	0.06%	$2,278,438	~ $56.96
No Irrigation System Incentive			$28,964,840	11.31	2020 to 2030	Impact Fee Incentive	8.10%	$2,560,994	~ $1.94
Rainwater Harvesting Incentive	1,318,374 (2030)	139.7 (2030)	$13,975,190	2.99	2020 to 2030	Impact Fee Incentive	2.14%	$4,673,977	~ $3.55
Water Reuse Incentive			$25,254,787	6.66	2020 to 2030	Impact Fee Incentive	4.77%	$3,792,010	~ $2.88

Figure 18: Comparison of municipal conservation programs and budgets. (Source: AIQUEOUS, 2016)

The figure above compiles key program metrics for a variety of municipal conservation programs found across the country. At the bottom of the table, the three conservation-based incentive options are provided as a comparison to more traditional types of conservation programs, including residential indoor and outdoor rebates, commercial indoor and outdoor rebates, turf replacement, and education/awareness. In the previous table, total demand reduction from each of these incentives was evaluated against total outdoor use from 2020 to 2030. In this latter table, however, these percent savings are presented relative to total annual sales for the year 2030 only. This comparison reveals far more substantive percent savings, which in most instances exceed the percent savings achieved by the other conservation portfolios. Moreover, in terms of dollars spent to secure these savings, the three incentive measures perform on par and in some instances, better than the municipal conservation programs. Likewise, the cost effectiveness of these incentives on a per capita basis is just as compelling. In fact, compared to the City of Austin's residential and commercial indoor/outdoor rebates and incentives program (for the years 2009 to 2011), the three impact fact fee incentives outperformed the city's conservation program in each category.

As these comparisons reveal, each incentive measure has the potential to offer meaningful conservation outcomes. Because limited data is available to inform the expected number of new developments to utilize these different incentive types, it is difficult to generate estimations with more precision. The best way to capture this variability is to evaluate a potential range of outcomes. Assuming the percent savings identified thus far represents a baseline, the figure below identifies a possible range of outcomes given a more conservative estimate (25% less participation compared to the baseline) and a more liberal estimate (25% more participation compared to the baseline).

Range of Potential Outcomes	Irrigation Incentive	Rainwater Harvesting Incentive	Water Reuse Incentive
Total Demand Reduction (MGD)	**8.5 - 14.2**	**2.4 - 3.7**	**5.0 - 8.3**
Demand Reduction as a Percent of Total Projected Outdoor Water Use (2020-2030)	**2.8 - 4.7%**	**0.7 - 1.2%**	**1.6 - 2.7%**
Demand Reduction as a Percent of Total Annual Sales (2030)	**6.1 - 10.2%**	**1.6 - 2.7%**	**3.6 - 6.0%**

Figure 19: Range of Potential Savings from Incentive Options. (Created by M. Bock)

Even when a range of potential outcomes is taken into account, these incentives still stand to offer a considerable amount in water savings. These savings also come at a reasonable cost, as evidenced by the dollars per MGD metric. The results of this analysis demonstrate that a conservation-based impact fee structure can provide the City of Austin with a reasonably robust, cost-effective strategy for pursuing its conservation goals and ensuring greater water security city-wide. However, further contextual review is necessary for informing the overall applicability of these incentive measures and addressing information that cannot otherwise be inferred from this data.

Chapter 4: Discussion

Based on the results of these findings, designing water impact fees to achieve specific conservation goals—in this case, reducing future demand for outdoor water—represents a relatively cost-effective strategy. In fact, compared to the costs associated with the city's new Water Treatment Plant #4 and the costs to expand the Ullrich Water Treatment Plant, these incentive mechanisms, especially the no-irrigation system measure, are quite advantageous, as the figure below illustrates.

	Impact Fee Incentives				WTP 4 (new facility)	Ullrich Plant (facility expansion)
	No Irrigation System	Rainwater Harvesting	Water Reuse	Combined		
Total Cost (million $)	$29	$14	$25	$68	$752	$231
MGD provided (i.e., reduced demand or added system capacity)	11.3	3.0	6.7	21.0	50.0	67.0
Cost (million $)/MGD	**$2.56**	**$4.67**	**$3.79**	**$3.25**	**$15.04**	**$3.44**

Figure 20: Cost Comparison of Impact Fee Incentives versus System Expansion Projects.
(Created by M. Bock)

Demand-side strategies, such as the incentives proposed in this analysis, can represent a cost-effective alternative to traditional supply-side strategies, such as system expansion projects. By incentivizing developers to opt not to install irrigation systems or by subsidizing the cost of installing rainwater harvesting systems, the City of Austin can reduce overall demands in the future at a cost far below the requirements of building a new plant all together. Although these impact fee incentives represent cost-effective strategies, it is important to address various implications of these strategies and their implementation. Doing so is necessary for providing a broader understanding for assessing their overall feasibility.

Implications for the No Irrigation System Incentives

The surest way to reducing outdoor water use is to encourage new development to not install irrigation systems in the first place. This is especially relevant in Austin's current development market because more and more new homes are equipped with in-ground irrigation systems. Ideally, the developer would utilize the incentive to incorporate drought-resistant landscape into the development—otherwise, the lack of an irrigation system to help maintain a healthy lawn could negatively impact property values. However, how can the city ensure that landscaping will the same and the property owner does not install an in-ground irrigation at later point in time? Certain mechanisms would, therefore, have to be in place to prevent this from occurring. For instance, the City of Austin could incorporate water budgeting into its water rate structure as a method for tracking fluctuations in water use. If the property owner were to exceed their water budget during periods of seasonal use, this would be a clear indicator that the site is using more water for outdoor purposes and may have installed an irrigation system.

Another equally problematic issue related to the irrigation incentive involves the concept of free ridership. In the case of irrigation systems, this occurs when a new development benefits from the incentive even though there were no plans to install an irrigation system in the first place. Instances of free ridership are more likely to occur in single family homes and commercial sites with little to no irrigated landscape. The only way to mitigate free ridership would be to structure the impact fees in a way that dis-incentivizes irrigation systems—e.g., the base water impact fee could be 25% of the MAF and developments requiring in-ground irrigation systems could then be required to pay 100% of the MAF. This is an alternative that certainly merits additional analysis to determine its cost-effectiveness.

Implications for the Rainwater Harvesting Incentive

The appeal of incentivizing rainwater harvesting through impact fees is two-fold: it encourages installations in new development (whereas current rebates offered by the City of Austin are typically used to install systems on existing sites); and it offers an opportunity to complement the city's Department of Watershed Protection and its efforts to reduce stormwater runoff. Rainwater harvesting is unique in that it merges the goals of Austin Water's Conservation Division and the Watershed Protection Department—rainwater harvesting not only reduces irrigation demands, it also reduces the flow of urban runoff into storm drains. Since these outcomes are mutually inclusive, the rainwater harvesting incentive presents an excellent opportunity to bring these two departments together and further bolster the city's rainwater harvesting initiative, both for new and existing development. For instance, this could involve cost sharing amongst the two groups—i.e., some of the funds acquired through the drainage charge could be apportioned to the costs of providing the impact fee incentive.

Implications for the Water Reuse Incentive

The biggest obstacle involving the water reuse incentive is the fact that the City of Austin already subsidizes access to the reclaimed water system. Not only are reclaimed water rates significantly lower (as much as one-third the price of potable water), but the city does not assess impact fees to connect to the purple pipe system. Moreover, the city's reclaimed water system is not accessible in all parts of the city, and as the city works to expand its infrastructure, it is investing substantial amounts of money[12] into the effort. Because of this, it may not be financially sound for the city to offer additional incentives

[12] In 2016, the Texas Water Development Board awarded the City of Austin a $86.9 million loan as part of the State Water Implementation Fund for Texas (SWIFT) to enhance its reclaimed water system infrastructure (TWDB, 2016)

to encourage customers to connect to the system. Over the long-term, this could present affordability issues because the city would essentially be shifting the costs of expanding the purple pipe line back onto existing customers, who may or may not be benefiting from the system. At some point in the future, it is possible the city may increase the rates for reclaimed water, at which point an incentive for tapping into the reclaimed system may be a financially viable option. However, this will largely depend on the city's capacity to supply reclaimed water and where new development is popping up in the city.

Implications for city-wide water system

Budgetary constraints represent a huge hurdle for the introduction of a conservation-driven impact fee structure. As it stands now, the City of Austin has acquired more than enough in water rights from LCRA and this supply will remain sufficient for quite some time. To enhance the delivery of water to Austin's expanding service territory, the city completed the construction a new water treatment plant (WTP-4) in 2014, a project the city financed for over $750 million. At the time plans for the new treatment plant were underway, Austin's GCPD was much higher and system expansion was presumed necessary to meet future growth projections. Had the city been able to anticipate significant drops in per capita usage, it could have delayed this costly capital project for many more years.

Over the short term as the city continues to pay its debt service for this project, it may be difficult to balance budget requirements with reduced revenue from impact fees. As water conservation initiatives continue to drive per capita usage down, reduced revenue from sales will also threaten the city's financial stability. Over the long term, though, the city's existing water supply may not be adequate to meeting rising municipal demand. Managing these demands now through conservation efforts is the most cost-effective solution to addressing these supply issues. While the value of capital infrastructure depreciates over time, the value of conservation represents a gradual appreciation year over year. For that reason, it can be difficult to justify these types of conservation-based incentives given the city's current financial obligations. These fiscal challenges, however, should not preclude the city from proactively exploring impact fee incentives and similar strategies because conservation will save the city tremendously in the future, both in terms of water and financial resources.

Final Recommendations

Despite the cost-effectiveness demonstrated by the proposed impact fee structures, other implications not captured within the quantitative analysis must also be addressed. Further analysis and discussion is therefore necessary for determining the overall applicability of these conservation-based incentives. These measures, however, serve as a useful guide for how to design impact fees to achieve conservation goals. Moreover, they offer valuable insight into additional conservation opportunities the city can consider as part of the ongoing IWRP planning process. For any conservation-based impact fee structures to be effective, it is crucial for the City of Austin to engage with stakeholders, especially the developer community. These incentives must resonate with developers and ultimately the end use customer, otherwise developers will not adopt more water-efficient measures into their building practices,. By maintaining fruitful dialog with these stakeholders, the city can design incentives to be more consistent with current and evolving market forces. Ensuring the building community's participation will require a strategic targeting approach based on customer retail class and meter sizes to help define the most appropriate incentive types and discounts. The city must be careful, however, to balance this fee structure and the amount of revenue it generates with their overall budgetary requirements. These efforts will be the deciding factor in determining the overall viability of conservation-driven impact fee structures.

Aside from offering incentive mechanisms, the city could also introduce ordinances restricting or mandating certain practices in new development. This alternative extremely cost-effective because ordinances can achieve the same conservation savings little to no cost for implementation and enforcement. In fact, ordinances restricting permanent, in-grounding irrigation systems and requiring on-site rainwater capture were measures recommended in the early phases of the IWRP planning process. Although ordinance-based strategies are extremely effective, it is not always an easy tactic to put into effect. Significant backlash can ensue from developers, concerned with the impacts mandates will have on their bottom line, and homeowners, concerned with the effect irrigation or landscape restrictions will have on their property values or the ongoing costs associated with rainwater harvesting systems. To avoid public uproar against these conservation strategies, it is easier, though less cost-effective, to attempt to incentivize market transformation.

The City of Austin already offers rebates for rainwater harvesting systems (up to $5,000 for single family, multi-family, and commercial sites), landscape transformation (up to $1,750 single family and $5,000 for multi-family), and irrigation system improvement (up to $400 for single family and up to $5,000 for multi-family) (City of Austin, no date). However, these incentives target existing development, not new growth. In order to promote broader market penetration of rainwater harvesting or native/drought-resistant landscaping, the City of Austin must leverage other incentive avenues, including conservation-based impact fee structures. Expanding these opportunities will help drive these conservation practices into wider acceptance across the city. Though it will take time for the effects of market transformation to materialize, the more comprehensive an approach the city pursues, the more effective their efforts will be. As such, conservation-based impact fee structures merit further evaluation by the city as it continues to lay the groundwork for its IWRP.

Chapter 5: Conclusion

There is little doubt that Austin's future as a thriving community is heavily dependent on its ability to ensure reliable, safe supplies of water to accommodate its rapidly growing population. Over the next 100 years, the City of Austin is expected to nearly quadruple in population, and with this influx of people comes added pressures on municipal water capacity. As the city's water demands continue to increase, the impacts of climate change will further exacerbate the availability and reliability of its water supplies.

To tackle these issues, the City of Austin has taken proactive steps aimed at ensuring the long-term longevity of the city's water supply and protecting the quality of life for its residents. These efforts include citywide conservation initiatives, which have translated to reductions in per capita demand, as well as the acquisition of additional water rights through the LCRA to expand available capacity. The city is driving these initiatives even further by developing a holistic approach to future water management as part of its IWRP.

As IWRP planning process moves ahead, its success requires a diverse portfolio of supply-side and demand-side strategies. To supplement the more traditional policy mechanisms being evaluated by the planning committee, this report sought to highlight a less commonly used financial tool: water impact fees. The objective of this analysis was to demonstrate how the City of Austin could re-structure its impact fees to encourage water efficient patterns of growth and what the fee structure would look like. To answer these questions, this analysis assessed the political, legal, and financial feasibility of designing impact fees to meet conservation goals. As evidenced in the report findings, the most significant savings potential exists in outdoor water use, and through three proposed incentive measures—an incentive for new development without irrigation systems, an incentive for new development with rainwater harvesting systems, and an incentive for new development connecting to the water reuse system—a viable, cost-effective alternative option exists for reducing future water demands. Before these incentive mechanisms can be successfully implemented, however, various barriers to their implementation must be addressed.

Although the conservation-based fee structures proposed in this report require additional refinement, these findings demonstrate the need to explore water impact fee incentives as another strategy to add to the city's toolbox. Further exploration will reveal the extent to which impact fees can shape future water demands and promote the IWRP's overarching conservation objectives. As the City of Austin works towards a water secure future, conservation will be the driving force, but a multi-faceted approach will be the key to ensuring adaptability in the face of so many uncertainties.

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